GUIDANCE MANUAL FOR EVALUATING APPLICATIONS FOR APPROVAL OF MOBILE PCB DESTRUCTION TECHNOLOGIES

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GUIDANCE MANUAL FOR EVALUATING APPLICATIONS FOR APPROVAL OF MOBILE PCB DESTRUCTION TECHNOLOGIES

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1.0 INTRODUCTION

This manual was prepared to provide approvals staff with direction on how to evaluate applications for approval of mobile PCB destruction technologies.

It should be noted that this document covers only mobile PCB destruction technologies and authorization of any testing proposal for:

- Class 1 systems (incineration or other thermal processes);
- Class 2 systems (chemical process).

and not:

- the approvals of Class 1, 2 or 3 sites;
- the movement or storage of PCB wastes.

This guidance manual should be used along with the following Ministry of the Environment publications:

1) Origin and Management of PCB Wastes;
2) Ontario Regulation 11/82: Waste Management - PCBs;
3) DETAILS DOCUMENT MOBILE PCB DESTRUCTION FACILITIES;
4) Ontario Regulation: Mobile PCB Destruction Facilities.

The above-mentioned documents detail all aspects of PCB waste management from when PCBs become a waste, to the requirements for disposal of the residues from destruction operations. This manual outlines the technology approval requirements of the regulation and the guidelines are mentioned but are not reproduced in detail.

The guidance presented in this manual constitutes suggestions for review and evaluation based upon best engineering judgement and is intended to help resolve technical issues on a case-by-case basis. The responsibility for applying the regulations and specifying the approval conditions lies with the Environmental Approvals Section and this manual will assist Approvals staff in arriving at decisions in a logical, well-defined and well-documented manner.

The Approvals staff may require technical assistance in the evaluation of certain applications, especially those for which there are no precedents. To this end, a team of experts in the various aspects of the field may be formed to provide increased capability to respond appropriately when applications are received, and to

provide direct access to specialized expertise. The team may augment Approvals staff's capabilities concerning technology hardware, facility design, analytical measurements and protocols, site survey and evaluation, stack sampling and environmental impact modelling.

2.0 HOW TO OBTAIN TECHNOLOGY APPROVAL FOR PCB DESTRUCTION FACILITIES

2.1 PROCESS

Before any facility is established to destroy PCB waste, it must receive various environmental approvals. The proponent of mobile PCB destruction technologies may elect to proceed as follows:

1) submit an application for approval of the technology without further testing (only if all the information required by Regulations and administrative standards is available); or
2) submit an application with some supporting information along with a proposal outlining how the remaining information will be obtained through either demonstration testing in Ontario or additional testing outside Ontario.

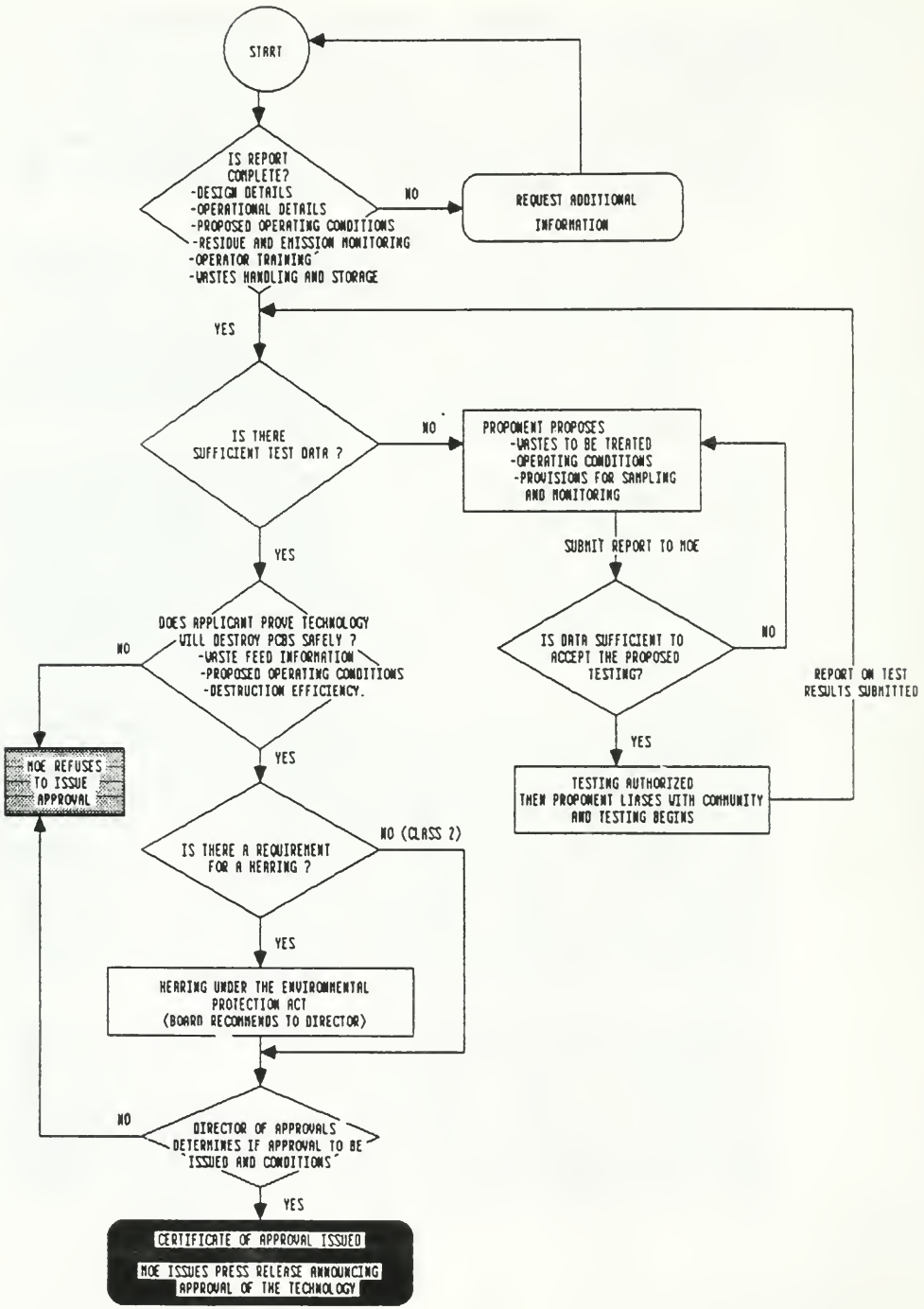
Applications for mobile PCB destruction facilities as well as proposals for additional testing outside Ontario and/or demonstration testing in Ontario (when required) will be evaluated through the approval process (* see Figure 1) and will include the preparation of a draft Certificate of Approval which will be reviewed with the proponent before a final Certificate of Approval is issued. In the case of Class 1 technologies, a hearing will be held prior to the issuance of the certificate.

If demonstration testing in Ontario is authorized, the unit must be set up and operated for "shake-down" purposes (without wastes), to identify possible mechanical problems which may have developed during transit, and to ensure the unit has reached operational readiness and steady-state operating conditions. After satisfactory completion of all shake-down operations, the actual PCB destruction demonstration testing can be carried out. The proponent would then be in a position to complete the formal application for approval once the results of the demonstration testing become available. The formal application must specify the operating conditions for which approval is being requested.

Detailed review of the demonstration test data will show either that the facility is capable of complying with the performance standards when operating within the test conditions, or that compliance is not attained. If compliance is shown, the approval certificate may be finalized to set the operating requirements demonstrated during the test burn. If compliance has not been shown and further demonstration testing in Ontario is necessary, then additional approvals must be obtained.

FIGURE1

FLOWCHART OF APPROVAL PROCESS FOR MOBILE PCB DESTRUCTION TECHNOLOGY



Once the Certificate of Approval has been issued, revisions to the Certificate will be difficult to make. For example, changes such as variations in the waste feed composition, operating conditions, etc., will be processed as new applications, and for Class 1 technologies will involve another hearing. Therefore, caution must be exercised when developing the range of allowable variations specified in the Certificate of Approval.

2.2 ENGINEERING ASSESSMENT REPORT

In reviewing and evaluating applications for technology approval, it is essential that all decisions are made in a well-defined and well-documented manner. An engineering assessment which discusses the reasons for the final decision should be prepared and become part of the administrative record.

3.0 INFORMATION TO BE SUBMITTED FOR TECHNOLOGY APPROVAL WHEN DEMONSTRATION TESTING IN ONTARIO OR ADDITIONAL TESTING OUTSIDE ONTARIO IS NOT REQUIRED

3.1 DESIGN DETAILS

A thorough description of the mobile PCB destruction facility should be provided with the application. In the case of an incinerator (Class 1 facility) this includes the following information:

- a set of drawings clearly showing:
  - the internal dimensions of the incinerator, particularly the afterburner section,
  - the location of all burners,
  - the location of all air supplies,
  - the location of all waste inputs,
  - the location of all temperature measuring/controlling devices;
- heat and material balance calculations based on design waste, fuel and air inputs;
- expected atmospheric emission rates for pollutants such as:
  - PCBs
  - PCDDs
  - PCDFs
  - particulate
  - HCl;
- details of emission control equipment;
- details of the quantity and quality of all other waste streams (liquid wastes, solid residues);
- details on how each type of liquid or solid residue will be disposed of;
- details on waste handling, transportation and storage;
- details on all waste stream monitoring programs.

3.2 OPERATION DETAILS

Operational details to be provided may include development data, operational data collected for a prototype unit, and/or data generated from a similar full scale PCB destruction system. This information, if sufficient, will be used in lieu of a demonstration test in Ontario. At a minimum, the performance data should include:

- waste and supplementary fuel analyses, (e.g. PCB, chlorobenzenes, trace metals, chlorine, sulphur, PCDD, PCDF, chlorophenols, and carbon);
- computations of the destruction and removal efficiency;

- average, maximum and minimum levels of pertinent operating parameters (e.g. temperature, O_2, CO, CO_2 and total hydrocarbon);
- results of any continuous monitoring;
- stack emissions (e.g. PCB, chlorobenzenes, chlorophenols, PCDD, PCDF, particulates, trace metals, HCl, Cl_2, THC, O_2, CO, CO_2, NO_x, SO_2);
- identification of any sources of fugitive emissions;
- quantities and composition of any other waste stream (e.g. scrubber blowdown, ash and other residues).

3.3 PROPOSED OPERATING CONDITIONS

The application should include a description of all the conditions under which the applicant proposes to operate the PCB destruction unit. Each of the operating parameters should be addressed. In addition, a brief description outlining the complete operating cycle of the destruction system should also be provided.

3.4 RESIDUE AND EMISSION MONITORING

The application must provide details on how the destruction facility and its associated components have been designed to ensure releases of PCBs and other contaminants are maintained in compliance with Ministry requirements. The application must also detail how the facility will be operated to prevent spills and handle residues to minimize risk of environmental contamination. Approvals staff should confirm that all waste streams have been identified and details provided on how they are to be treated and disposed of.

3.5 OPERATOR TRAINING

The proponent must submit adequate documentation to demonstrate that personnel have been properly trained to operate the mobile PCB destruction facilities under all conditions (e.g. normal as well as emergency situations). Usually this would include details on actual operating experience with the unit. Operators should be thoroughly familiar with:

a) the basic physical and mechanical features of the mobile PCB destruction facilities, for which approval is being sought;
b) the function and location of the components of the destruction facilities including the control panel;
c) safety features of the various control units;
d) handling guidelines for PCB wastes as well as any other substances used for treatment (e.g. caustic soda, oxygen, sodium);
e) occupational health and safety guidelines for PCB wastes and any other substances used for treatment;
f) the Occupational Health and Safety Act.

3.6 PCB WASTES HANDLING AND STORAGE

The application should identify how PCB wastes will be handled in and around destruction sites in accordance with Ontario's legislation.

All waste transportation in Ontario is subject to the general requirements of Part V of the Environmental Protection Act and Regulation 309. The transportation of PCB wastes from storage facilities may also be subject to the requirements of Ontario Regulation 11/82.

Transportation of wastes to the site must be by approved waste haulage contractors specifically authorized to handle PCB wastes. Transfers and receipts will be documented under the Ministry of the Environment manifest system and the recording requirements of Ontario Regulation 11/82.

Containers used to bring PCB wastes to the mobile destruction site (bulk tank trucks, drums, and PCB equipment) are to be stored in temporary (preferably sheltered) storage facilities established at the site in accordance with the requirements stipulated in the appropriate regulations.

Wastes shall not be transported to an approved destruction site until five days prior to commencement of operation and the volume stored should not exceed the volume required for five days of continuous operation. If a proponent anticipates situations where this restriction would result in the incomplete filling of a transport vehicle subsequently used for storage at the destruction site, a detailed justification should accompany any request for approval of storage of volumes larger than five days throughput at the destruction site. Such permission would be indicated as a condition on the Certificate of Approval for the site.

4.0 INFORMATION TO BE SUBMITTED FOR DEMONSTRATION TESTING IN ONTARIO AND/OR ADDITIONAL TESTING OUTSIDE ONTARIO

A proposal for demonstration testing in Ontario or additional testing elsewhere should include a description of all sampling and monitoring procedures and equipment, a test schedule and protocol, a description of the range of conditions under which the PCB destruction unit will be operated, a description of emergency procedures for waste feed cutoff, details of shutdown procedures for the destruction facility and details on the emission control equipment. The demonstration test proposal should discuss all methods planned for testing the components of the destruction unit (e.g. waste feed mechanisms, monitoring devices, air pollution control devices). In addition, the origin and nature of the waste feed(s) to be used should be described in detail.

In planning a demonstration test in Ontario or additional testing outside Ontario, the applicant must identify the conditions under which the destruction facility must be operated to successfully destroy the designated PCBs. Because the results of the test program directly influence the terms of the final approval for the destruction technology and because modification of the certificate will be very costly and time consuming, the test conditions should be selected to account for any planned or possible variations in the waste feed and operating conditions that might be encountered during commercial operation. By testing these components over a wide range, the applicant may have sufficient data to permit approvals staff to build enough flexibility into the approval conditions to account for future changes in waste feed. Therefore, careful planning of the testing program can reduce or perhaps eliminate the need for future approval modifications or further testing.

Descriptions of the information required for demonstration and/or additional testing can be found in the document entitled "DETAILS DOCUMENT, MOBILE DESTRUCTION FACILITIES".

5.0 EVALUATION OF AN APPLICATION FOR TECHNOLOGY APPROVAL WHICH DOES NOT NEED DEMONSTRATION TESTING IN ONTARIO OR ADDITIONAL TESTING OUTSIDE ONTARIO

Evaluation of the application will encompass the following activities:

- Review of the waste feed information;
- Review of the proposed operating conditions; and
- Review of the destruction technology.

5.1 WASTE FEED INFORMATION

A set of operating requirements specific to each waste feed which the applicant indicates will be destroyed must be designated. These requirements must reflect the set of conditions which have been shown to achieve the performance standards.

Approvals staff may request any additional information required to evaluate the destruction unit's performance and establish adequate operating conditions.

5.1.1 Waste Analysis

A thorough waste analysis is required for evaluation of applications for Certificates of Approval. Information on routine variations in waste composition should also be provided.

Applicants should have arranged for wastes to be analyzed during commercial operations to ensure compliance with the approval conditions and to ensure against manifest discrepancies during routine operation.

Where appropriate, applicants should measure the viscosity of the waste feed to provide information with respect to the adequacy of liquid waste delivery systems.

A proximate analysis (moisture, volatile matter, fixed carbon, and ash) and/or an ultimate analysis should be provided to thoroughly characterize wastes that are to be disposed of in Class 1 facilities. The ultimate analysis should include parameters such as carbon, hydrogen, sulphur, oxygen, nitrogen, halogens (chlorine and fluorine), heavy metals, (e.g. mercury, lead), PCBs, chlorobenzenes, dioxins and furans, as well as any other elements that can influence the combustion operation (e.g. phosphorous).

This information is necessary to evaluate the design of the Class 1 facility as well as to determine potential contaminant discharges which would be used as a basis for establishing conditions on the Certificate of Approval for acceptable variations in waste composition.

The analytical parameters for routine analysis of the waste should be suggested by the applicant, evaluated by the approvals staff and included in the Certificate of Approval. The application should also identify the procedures used for sampling and analysing the waste feed and describe all sample preparation and storage techniques. Detection limits and standard calibrations should be provided for each analytical method used. If the applicant proposes the use of analytical methods different from those recommended by MOE, detailed descriptions of the analytical protocols are to be provided so that approvals staff may ensure they include appropriate consideration of detection limits, precision, accuracy and potential interferences.

The Certificate of Approval should set appropriate limits on the chemical and physical properties of the waste(s) to be destroyed, including as a minimum:

- Physical characteristics (e.g. physical state);
- Heating value (where appropriate);
- Ash content (where appropriate).

5.1.1.1 Physical Characteristics

Changes in the physical state of the waste feed can result in changes in the performance of PCB destruction units. The approval should therefore limit the physical state of the waste to that for which there is proven operational data. Precise guidance for establishing limits on physical characteristics is not provided because determination will be highly case-specific and will require engineering judgement.

An incinerator having both liquid injection and rotary kiln capabilities may effectively treat liquid, solid and sludge wastes. Furthermore, any of

these wastes might be fed to the incinerator in containers. The approval should then restrict the allowable physical form to that used during the operation for which data were supplied.

If containerized wastes are to be burned, the procedures for charging should be specified. For example, drums should be opened or punctured prior to charging to a kiln to minimize the potential "puffing" or "explosion" within the unit.

5.1.1.2 Heating Value

The waste feed heating value must be determined in order to be able to maintain a relatively constant thermal load to incinerators, thereby ensuring stable combustion zone conditions. Decrease in the heating value of liquid and/or gas feed streams may require the use of auxiliary fuel to maintain the temperature to adequately destroy the PCB waste.

The lowest heating value for liquids and gasses shown to correspond with the required performance level should be designated in the Certificate of Approval as the lowest allowable heating value. An upper limit on heating value of liquids and gasses is not necessary because wastes with higher heating values are presumably more easily burned.

When waste streams to be burned cannot be adequately blended to meet the heating value requirements of the Certificate of Approval, it becomes necessary to inject lean wastes separately. When evaluating the separate injection of lean waste, consideration must be given to the potential of flame quenching of the higher heating value waste.

The incineration equipment should be designed to reflect the "worst-case" situation with respect to the injection of aqueous wastes, thereby avoiding or

minimizing problems associated with flame quenching. Therefore, in developing conditions for the Certificate of Approval, the potential for flame quenching situations should also be addressed.

In the case of solids fed to rotary kilns or other PCB destruction equipment, a different approach to specifying a heating value for waste is needed. Many solid wastes, by their very nature, are subject to wide variations in heating value. Therefore, incinerator design must attempt to deal with this problem. A two-stage combustion system (e.g. a rotary kiln followed by an afterburner) is best suited to address this particular concern. Such designs provide for the volatiles in the solids to be vaporized in the primary chamber (kiln) and subsequently destroyed in an afterburner or secondary combustion chamber. Therefore, in specifying heating values for solid waste feeds, a lower heating value limit may not be required if the PCB destruction unit is equipped and operated to maintain sufficient temperature by addition of auxiliary fuel in the secondary chamber.

It should be noted that many solids, including drummed materials, can cause sudden increases in heat release in an incinerator which can result in overpressuring in negative pressure systems (puffing) and oxygen deficient combustion conditions. This may result in emissions of products of incomplete combustion from the stack. Therefore, in setting heating value limits for solids, approvals staff should consider placing an upper limit on the quantity of waste in each drum on a Btu basis and/or limiting the rate at which solids and drums can be charged to the incinerator.

5.1.1.3 Ash Content

The maximum allowable ash content of the waste should be specified to ensure that the waste fed to the destruction

unit remains similar to that for which information has been provided in the application.

5.1.2 Waste Feed Rate (Class 1 Technologies)

For combustion technologies, the waste feed rate may be effectively controlled by stipulating the maximum total thermal input rate to the combustor. The maximum total thermal input rate including the heat input contributed by the PCB waste and auxiliary fuels should be specified on all Certificates of Approval. Turndown, or reduced thermal input to an incinerator, from the maximum approved value should also be specified on the Certificate of Approval. Additional restrictions on the waste feed rate may be imposed by specifying a mass or volume feed rate of the waste (e.g. kilogram per hour or litres per hour). Some incinerators have multiple waste feed locations; therefore, restrictions with respect to waste feed locations should also be considered to ensure an adequate residence time within the combustion unit.

5.2 PROPOSED OPERATING CONDITIONS

5.2.1 Operation Parameters (Class 1 Technologies)

A Certificate of Approval for Class 1 technologies should specify operating requirements for the following parameters:

- CO, CO_2, THC and O_2 levels in the stack exhaust gas (if an incinerator type);
- Waste feed rate;
- Combustion or reaction temperature;
- Retention time.

The numerical values of these parameters will be governed by the performance data reported by the applicant and will correspond to the performance level achieved in previous operations. Therefore, at a minimum, values for these parameters should be reported for a corresponding destruction and removal efficiency, scrubber removal efficiency, and emission of particulate material.

The applicant should report values for each operating parameter including normal fluctuations. Conditions for the Certificate of Approval can be written to incorporate the range

identified. Although an applicant may report the operating parameter as a range (e.g. 980°C ± 110°C), or may provide the actual readout from the monitoring instrument which shows fluctuations over time, submission of readouts from continuously monitoring equipment is recommended.

Each operating parameter should be reported at several levels. If each level is reported along with a description of the fluctuation that occurred, the applicant will have established a wide range of conditions over which adequate performance is achieved. Therefore, conditions on the Certificate of Approval for each parameter, may be expressed as the ranges that can achieve satisfactory destruction performance. This approach provides the operator with a high degree of operational flexibility.

5.2.2 Exhaust Gas Monitoring (Class 1 Technologies)

The amount of CO, CO_2, O_2 and total hydrocarbons present in the combustion exhaust gas is a function of many factors, including combustion temperatures, residence time of the combustion gasses at the combustion temperature, degree of mixing of fuel(s) and air, and the amount of air used in excess of stoichiometric requirements. These factors are interdependent to some extent; however, residence time and the degree of mixing of air and fuel(s) are primarily determined by the combustion chamber and burner design. Therefore, changes of CO, CO_2, O_2 and total hydrocarbon concentrations will reflect changes in excess air usage and in combustion temperatures.

The continuous measurement of these gasses is useful for several reasons. CO is a reliable indicator of combustion upset. The concentrations of CO_2 and CO can be used to determine combustion efficiency. Monitoring these gasses in the exhaust gas is most conveniently done in the exhaust stack, where temperatures are relatively low; however, measurement at other points in the system is acceptable. For example, they may be measured in the take-off duct immediately after the combustion chamber or afterburner section.

The maximum allowable CO concentration should be specified. This value should correspond to that reported in the information submitted by the

applicant as being in compliance with the performance standards. However, some allowance for normal variation may be specified on the certificate to protect against unnecessary activation of the waste feed cutoff system. The applicant should submit the actual readouts from the monitoring devices. These charts will provide data describing the average concentrations and the frequency, magnitude and duration of any downward or upward spikes. Conditions that accommodate some degree of fluctuation in the stack gas concentrations can then be selected.

5.2.3 Combustion Temperature (Class 1 Technologies)

The Certificate of Approval must specify a minimum combustion temperature. It should be the minimum temperature shown to correspond with achievement of the required performance standards. Specification of a maximum allowable combustion temperature is not necessary because increased temperatures presumably increase destruction efficiency. Furthermore, the maximum temperature at which the incinerator will be operated is limited by refractory capabilities and other design considerations. .

In setting the requirement for minimum allowable combustion temperature, fluctuations should also be considered. Some allowance for normal variations is needed to protect against unnecessary activation of the waste feed cutoff system as a result of temperature "spiking".

Consideration must also be given to the location of the temperature sensing device(s). In many instances, temperature sensors will be located at several points in the system. The reported temperature should be measured at the point where the data will be most representative of the gas temperature as it exists in the combustion chamber. Although the exact location of the temperature sensor will vary in each case, a location should be specified in the certificate to ensure that temperature is always monitored at the same point in the system during routine operation.

5.2.4 The Emergency Waste Feed Cutoff System (Class 1 Technologies)

The automatic waste feed cutoff system is required to shut off waste feed to the PCB destruction unit whenever the operating parame-

ters deviate from the limits set in the Certificate of Approval. Therefore, the cutoff valve should be interlocked to all of the required continuous monitoring devices. These devices include monitors of temperature, stack exit velocity, and carbon monoxide level in the stack gas. For each of these parameters, the certificate should include a provision that establishes both a range for operation and a level, somewhat beyond that range, at which the emergency waste feed cutoff system must be activated.

The following discussion provides an example for proper integration of the waste feed cutoff system with the combustion temperature monitor. However, similar approaches may be taken for integration with other operating parameters as well.

The cutoff temperature may be selected in several ways, each of which requires some degree of judgement. For example, it may be selected by calculating a time-weighted average of the temperatures recorded below the target operating temperature. Alternatively, approvals staff may select the temperature of the lowest spike as the automatic cutoff temperature. In this case, however, a rarely occurring, very large downward spike should be considered unrepresentative of normal temperature fluctuation and should be disregarded. The condition might also be written to establish an automatic cutoff which allows for momentary excursions by specification of allowable excursion magnitude, frequency and duration. Conceptually, this type of control could best be accomplished using a system which would limit the total number of degree-minute below a prescribed level before activation of the waste feed cutoff mechanism. Such a system, however, will not always be available for use by the operator. The necessary limits for such a system would vary from case to case. Approvals staff should require that detailed information regarding temperature fluctuations be provided. When selecting the actual limit on degree-minute of deviation, approvals staff should generally allow deviations to occur for only a small fraction of the total operating time. This approach is advantageous because it allows for the possibility of very large, but infrequent and brief downward spikes without activation of the automatic waste feed cutoff.

5.2.5 Operation Parameters (Class 2 Technologies)

A Certificate of Approval for Class 2 technologies should specify operating requirements for the following parameters:

- Concentration of the waste feed;
- Waste feed rate;
- Reaction temperature;
- Retention time;
- PCB level remaining in the mineral oil.

The numerical values of these parameters will be governed by the performance data reported by the applicant and will correspond to the performance level achieved in previous operations. Conditions on the Certificate of Approval should be written to incorporate the full range of operation reported by the applicant to allow an appropriate degree of operational flexibility.

5.3 DESTRUCTION TECHNOLOGY

Applicants may provide different types of performance data for the proposed destruction technology. There is no standard format for the submission. Because approval conditions will be established from the data provided, approvals staff must (be able to) accurately interpret the information as provided by the application.

5.3.1. Evaluation of Data Submitted

When evaluating technology performance data, approvals staff should make the following determinations:

- Similarity of previous and proposed wastes;
- Similarity of previous and proposed destruction units;
- Acceptability of previous source testing program (does it meet Ontario Source Testing Code requirements?).

These determinations should be made prior to checking the calculations of the destruction performance results.

If available data are so incomplete as to preclude comparison between the previous and propose wastes, then the wastes should be considered dissimilar and further performance data should be requested.

The design and operating data of the PCB destruction unit should enable approvals staff to compare the unit which supplied the operating data with the destruction unit described in the application. It is, therefore, necessary that the data for the previous unit be as detailed as the data submitted for the proposed unit in order to determine similarity.

5.3.2 Interpretation of Engineering Data

Records of continuously monitored parameters must be submitted to ensure that steady state conditions were achieved in the establishment of the proposed operating conditions. If an applicant specifies only average or median values, the data from which the values were derived should be requested.

5.3.3 Residues, Emissions and Other Discharges

Approvals staff must be satisfied that the facilities are designed and can be operated so that emissions of PCB vapours, spills and accidental PCB releases are minimized and contained. The detailed description of materials handling and control procedures, including equipment design features intended to prevent spills and vapour losses, should take into consideration published Environment Canada and Ministry guidelines, as well as, codes of practice such as:

1. Handbook on PCBs in Electrical Equipment, Environmental Protection Service, Environment Canada, December, 1982;

2. Origin and Management of PCB Waste, Ministry of the Environment, April, 1984.

Approvals staff should ensure that materials of construction compatible with PCB wastes are used. Flanges, joints and couplings in piping arrangements should be minimized. Vapour losses from tank vents and other sources should comply with Ministry requirements. Consideration should be given to vent these emissions through activated carbon cartridges or return them to the destruction process in order to control or destroy PCB vapours.

Some measures must be taken to exclude precipitation from spill containment areas or, alternatively, to provide methods of collecting and treating all PCB contaminated precipitation.

Analysis of continuous and/or batch discharges of any liquid wastes should be carried out on a regular basis, for PCB and other relevant parameters to ensure compliance with Ministry requirements.

The application for approval must indicate that solid wastes resulting from the operations will be analyzed for PCB content prior to disposal. Details on what will happen if the PCB levels are above Ministry standards must also be provided.

5.3.4 Inspection Requirements for the Emergency Waste Feed Cutoff System

Proponents should provide for at least weekly testing of the automatic waste feed cutoff system. Monthly testing may be allowed in cases where the applicant has shown that weekly testing will be highly disruptive and that monthly testing is sufficient. This test is intended only to verify operability of the emergency waste feed cutoff system and should not require dismantling of equipment or unscheduled calibration of sensors.

Complete shutdown of the destruction unit is not necessary for testing the feed cutoff valves or devices and the associated safety system. The valves may be checked while waste is being charged to the unit and the potential for creating upset conditions are at a minimum. The valve needs to be activated only once during an inspection; a check of every input to the safety system does not have to activate the valve. Additionally, if the valve is "fail safe" (i.e. it fails in the closed position), only the control panel circuits and associated alarms need weekly testing; and the valve need not be activated. Since cutoff valves are designed to operate for over one million cycles, testing should not be considered to contribute significantly to wear. Detectors and sensors are generally connected to the cutoff valve through relays, which are often equipped with an integrated test circuit.

Approvals staff should specify the inspection requirements on a case-by-case basis. The following factors should be taken into account before specifying a schedule for testing:

1. Extent of integration of the destruction unit with other on-site processes:
   - If the unit is closely integrated, testing is likely to be complex and time consuming.

2. Installation of multiple burners:
   - Incinerators with more than one liquid waste burner will be better able to maintain thermal input to an incinerator as the cutoff valve to each burner is tested.

3. Presence of a solid waste loading system:
   - Momentary cutoff during inspection of a conveyor belt, screw feeder, or hydraulic ram should not upset conditions in the destruction unit because such feed systems are not likely to be the only source of thermal input.

4. Availability of test circuits:
   - Checks and inspections of safety systems equipped with test circuits, test jacks and signal simulators are easily performed and may not require the present of an instrument mechanic.

5. Safety system design:
   - The more complex a safety system is, the longer it will take to check. Also, if accessibility to system components is a problem, a system check is further complicated.

When evaluation of these factors indicates that weekly testing may be impractical, alternatives may be considered. For example, weekly inspection might be limited to testing the waste feed cutoff valve and more comprehensive testing of the system (e.g. verifying operability of alarms, sensors and associated control circuitry) could be conducted at longer intervals. Such a minimum weekly inspection could involve triggering of the waste feed cutoff valve by a simulated low combustion chamber temperature. This test should be conducted by properly trained personnel, e.g. an

instrument mechanic. Should the test reveal that the system is not functioning properly, the Certificate of Approval should require that the waste feed be cutoff immediately and the necessary repairs made.

A second approach to inspection of the waste feed cutoff system might involve weekly testing of the valve and rotational testing of the control circuitry which interlocks the valve with the various control parameter monitors. For example, during Week 1, the valve might be activated by inducing a low temperature condition. During Week 2, a high carbon monoxide level might be used to activate the valve. This would be followed, in Weeks 3 and 4, by activation of the circuitry interlocked to the gas flow velocity monitor and any other continuous monitoring devices. This inspection method incorporates weekly testing of the cutoff valve(s) with rotational (monthly, or bi-monthly) testing of the system components.

Daily inspection of the mobile PCB destruction unit may be limited to visual examination for leakage, spills, corrosion, hot spots and malfunctions. The inspection should reveal whether gauges, recorders and monitors are functioning and if there are any signs of tampering with incinerator equipment. Visual inspection should also identify needs for repair.

6.0 EVALUATION OF AN APPLICATION FOR DEMONSTRATION TESTING IN ONTARIO AND/OR ADDITIONAL TESTING OUTSIDE ONTARIO

The document "DETAILS DOCUMENT MOBILE PCB DESTRUCTION FACILITIES" may be used to determine whether the applicant has supplied at least the minimum amount of information. A completeness check should be the first step in reviewing the proposed plan. Approval documents should provide sufficient flexibility to allow changes if specific analytical methods used in the test need to be updated and/or dates and schedules require revision.

6.1 SELECTING THE TEST WASTE FEED

The specification of waste composition to be tested should be developed primarily from the PCB level in the waste, the state of the waste, the organically bound chloride content, and the ash content. Other parameters may be used as agreed upon by approvals staff and the applicant.

6.2 OPERATING CONDITIONS FOR THE TESTING PROGRAM

The testing program must provide an accurate description of the performance and operation of the destruction unit, identify a range of values for each operating parameter, and provide an indication of the effect on performance, particularly the destruction and removal efficiency, that results from a change in one or more of the operating parameters. The number of runs to be made during the testing program, as well as the range of operating conditions during testing, should be suggested by the applicant.

When the design includes multiple waste feed locations and multiple combustion chambers, as may be the case for some Class 1 technologies, the test program should include an evaluation of alternate feed locations.

The testing proposal should specify intended steady state values for each operating parameter. Maintenance of steady state conditions is essential to obtaining meaningful test results. At a minimum, testing should be carried out at one set of steady state operating conditions (i.e. when the value of a measured parameter does not significantly change).

The applicant should carry out testing of the destruction unit to determine the greatest flexibility in approved operation. The applicant should consider testing the destruction unit at the most severe and most

lenient expected operating conditions, and possibly at intermediate conditions as well. This will identify the greatest range of acceptable destruction capability and also establish operating flexibility.

Testing a range of operating conditions will be particularly important when the destruction technology is new and has not been previously evaluated. In cases where the destruction unit is already in commercial operation, testing may be required only for the conditions under which the unit is to be normally operated. However, the applicant may wish to view the test program as an opportunity to examine other operating conditions to determine whether operating costs can be reduced (e.g. by reducing combustion temperature, increasing waste feed rate, or reducing use of auxiliary fuel, etc.) without decreasing the acceptable level of performance.

The proposed testing program should be reviewed to determine whether the methods used for sampling and analysis are acceptable and whether the data generated are likely to establish that the PCB destruction facility is capable of achieving the performance standards.

6.3 PROVISIONS FOR SAMPLING AND MONITORING

The proposed testing programs and/or test results should be reviewed by the Air Resources as well as other Branches to ensure compliance with the Ministry requirements (e.g. Source Testing Code).

Comprehensive sampling and monitoring during the testing of a Class 1 technology is essential for documenting compliance with the performance standards and for developing the conditions to be used in granting technology approval. At a minimum, sampling and monitoring data from the testing program must be sufficient to provide a quantitative analysis of the PCBs in the waste feed, exhaust gas, liquid effluents and/or scrubber discharges (if any), ash, and other residues; a computation of destruction and removal efficiency (DRE); a computation of HCl removal efficiency; a computation of particulate emission rate; an identification of sources of fugitive emissions; a measurement of average, maximum and minimum operation temperature and stack gas velocity; and a continuous measurement of operating temperature, O_2, CO, CO_2 and THC concentrations in the exhaust gas. Justification with supporting documentation must be provided if the applicant feels that the above-noted information does not apply to a particular technology.

Testing programs for Class 2 technology must contain the shorter but equivalent sampling and monitoring requirements established in the previously mentioned document entitled "DETAILS DOCUMENT MOBILE PCB DESTRUCTION FACILITIES."

In addition to the sampling and monitoring specifically required, approvals staff should consider requesting whether other parameters should be measured. For example, combustion gas temperature at the point of entry to the air pollution control equipment may be routinely monitored to ensure proper operation of the emission control system, or flow rates for auxiliary fuel and scrubber liquid might also be monitored to further ensure that proper operating conditions are maintained.

The testing plan should also include descriptions of process monitoring equipment, sampling frequencies, and procedures, as well as a diagram showing the location of each sampling and monitoring point.

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